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ABSTRACT

A study was conducted to determine the effectiveness of using advance organizers in instruction at the graduate level. Participants were 218 graduate students in research methodology courses. Fifty-four students were enrolled in sections in which advance and post organizers were used; 164 were enrolled in sections in which this type of instruction did not take place. Conceptual knowledge, involving students' command of research concepts, methodologies, and applications, was measured individually in both sets of classes through midterm and final examinations. Findings show that students in the advance organizer sections of the course obtained higher levels of overall achievement than did their counterparts. The effect size pertaining to this difference was 0.54, which is considered moderate. The implications of these findings are discussed, as are recommendations for incorporating advance and post organizers in research methodology courses. (Contains 1 figure and 44 references.) (SLD)

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The Effect of Advance Organizers on Achievement in Graduate-Level Research Methodology Courses

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Abstract

In an effort to increase achievement levels in graduate-level research methodology courses, some instructors are using advance and post organizers. However, to date, no study has investigated the effectiveness of this instructional technique in these courses. This was the purpose of the present study. Although a myriad of studies has been conducted during the past three decades assessing the effectiveness of advance organizers, few of these investigations have been undertaken at the graduate level. Subjects comprised 218 students, enrolled in a mid-southern university's graduate-level research methodology courses. Fifty-four students were enrolled in sections in which advance and post organizers were used; 164 were enrolled in sections in which this method of instruction did not take place. Conceptual knowledge, involving students' command of research concepts, methodologies, and applications, was measured individually in both sets of classes via midterm and final examinations. Findings revealed that students enrolled in the advance organizer sections of the course obtained higher levels of overall achievement than did their counterparts. The effect size pertaining to this difference was .54, which is considered moderate. The implications of these findings are discussed, as are recommendations for incorporating advance and post organizers in research methodology courses.

The Effect of Advance Organizers on Achievement in Graduate-Level Research Methodology Courses

As the importance of research is being recognized increasingly, so more students are required to enroll in research methodology courses as a necessary part of their graduate degree programs. Unfortunately, it appears that these courses are exceedingly difficult for many students (Onwuegbuzie, 1997; Onwuegbuzie, Slate, Paterson, Watson, & Schwartz, 1998). Indeed, these students typically experience lower levels of performance in these courses than in their other graduate-level classes (Onwuegbuzie et al., 1998). In an attempt to increase achievement levels, research methodology instructors have begun to experiment with a variety of teaching strategies. However, many of these strategies, such as cooperative learning (Onwuegbuzie & DaRos, 1998), have led to mixed findings with respect to their effectiveness.

Since many students report that research methodology courses are far removed from their own fields, they have difficulty adjusting their cognitive set to the study of this discipline (Onwuegbuzie, 1997). Thus, although not yet tested empirically, it is possible that the subsumption theory of learning, which is based on the assumption that cognitive structure is hierarchically organized, may be particularly pertinent in research methodology classes. According to this theory, which was first introduced by Ausubel (1960), meaningful learning occurs when an individual's existing knowledge interacts with new information in a non-arbitrary way. Relevant prior knowledge, in the form of general ideas, facilitates the incorporation of meaningful concepts into this cognitive structure. Ausubel maintains that learning a new concept is meaningful when it can be classified correctly and arranged in the learner's memory and can, therefore, be retained for a long time. Accordingly, new specific information

is learned and stored in hierarchical form, with broader and more abstract previously learned concepts subsuming more specific, new concepts. Ausubel thus predicted that *advance organizers* enable students to encode, to organize, to retain, and to recall any subsequently read material to be learned.

The advance organizer is a set of instructional materials which is related to new material that is presented on a higher level of abstraction, inclusiveness, and generality than the more detailed and differentiated material to be learned (Ausubel, 1968). The overall goal of the advance organizer, which is presented to students before they read unfamiliar material, is to bridge the gap between what learners already know and what they need to know for comprehension of a new concept to occur. According to Ausubel (1968), advance organizers help "to provide ideational scaffolding for the stable incorporation and retention of the more detailed and differentiated material that follows" (p. 148). Advance organizers are different from summaries or overviews which are presented at the same level of abstraction, inclusiveness, and generality, and which only emphasize important points, thus achieving their effects by repetition and selective emphasis on key words and central concepts (Ausubel, 1963).

Ausubel (1963) theorized that three of the main factors which influence the learning and retention of meaningful information are (1) the availability of relevant anchoring ideas, (2) the stability (i.e., clarity and organization) of these ideas, and (3) the distinguishability of the new ideas from the anchoring ideas. By recalling frameworks of previously learned concepts, advance organizers can be used to provide ideational scaffolding for new ideas and to discern similarities and differences between the new material and previously learned concepts.

Similarly, advance organizers have been postulated as facilitating the

incorporation and learning of new material in the following three ways: (1) by activating relevant subsumers already present in the learner's cognitive structure, (2) by providing subsumers where none previously exist, and (3) by reducing the importance of rote memorization, since key anchors are supplied to which new material can be meaningfully related (Lawton, 1977).

Advance organizers also have been conceptualized as falling into one of two categories: comparative and expository (Mayer, 1979). Comparative organizers activate already existing schemata and thereby allow for enhanced learning of subsequent content (Ausubel, 1968). In contrast, expository organizers provide knowledge which readers have not yet acquired in order to allow for the comprehension of subsequent material (Ausubel, 1968).

Advance organizers can be presented in many forms. For example, the instructor could provide an introductory overview in which the entire lesson or course is presented in outline form. According to Botwinick (1978), this provides an early opportunity for the learner to see the "map" which is being followed. Additionally, the advance organizer could take the form of an introductory statement about the content of a lesson or a series of readings followed by several key questions for learners to consider while undertaking the assigned readings or participating in the lesson. Peterson (1983) contends that these questions can help the learners to develop a purpose for the readings and to organize the material as they read or listen. Advance organizers also could take the form of a set of notes to follow or a list of concepts or facts to be examined.

Increasingly, advance organizers have been presented graphically. These graphic organizers now are referred to as concept maps. These concept maps are "diagrammatic representations of the basic vocabulary of a unit so as to show

relationships among the concepts represented by those words" (Herber & Sanders, 1969, p. 4). Concept maps have been recommended for use in chemistry (Novak, 1984), physics and literature (Moreira, 1985), reading (Gold, 1984), social studies (Wease, 1986), and computer-assisted instruction (Heinze-Fry, Crovello, & Novak, 1984). Indeed, some researchers contend that, given proper instruction in concept mapping, a student of any ability level can construct a concept map.

Despite some inconsistency in the research findings (Anderson, Spiro, & Anderson, 1978; Barnes & Clawson, 1975; Clark & Bean, 1980; Hartley & Davis, 1976), many researchers who have utilized meta-analytic techniques have reported that advance organizers exert a modest but significant effect in facilitating learning (Kozlow, 1978; Luiten, Ames, & Ackerson, 1980; Mayer, 1979; Moore & Readance, 1984). In other meta-analysis reviews, Walberg (1984) found an effect size of 0.20, and Stone (1982) reported an effect size of .48. In fact, Luiten et al. (1980) concluded that the benefit of advance organizers extended to "all content areas examined...and with individuals of all grade and ability levels" (p. 217). Moreover, the effects of advance organizers tend to be optimal if they are well learned, are presented in a concrete rather than abstract manner, and are followed by a moderate delay prior to reading the to-be- learned material (Corkill, Glover, Bruning, & Krug, 1988; Dinnel & Glover, 1985; Marshark, 1985; Mayer, 1984). In addition, some researchers (e.g., Lenz, Alley, & Schumaker, 1987) contend that advance organizers are effective only when students are taught to use such techniques.

Advance organizers have been found to promote retention of conceptual but not factual information (Mayer & Bromage, 1980) and to enhance problem solving which involves transfer (Mayer, 1980). According to Mayer (1979, 1980), advance organizers are even more beneficial for inexperienced or low-ability learners

than for higher ability learners. In any case, this form of presentation appears to be useful whether it is utilized before (i.e., advance organizers) or after (i.e., post organizers) the text (Luiten et al., 1980). Some researchers contend that advance organizers can be particularly beneficial for older students. In particular, Peterson (1983) asserts that advance organizers can bridge the gap between what older students already know and what is being learned.

With respect to concept maps, Novak, Gowin, and Johansen (1983) found that students who were trained in concept and vee mapping tended to exhibit knowledge of more concept relationships than did students who were not trained. Additionally, Willerman and Mac Harg (1991) reported an effect size of .40 for eighth-grade students enrolled in science classes, in favor of those who used concept maps. Indeed, it has been found that even more information is recalled when graphic elements are incorporated into the advance organizer (Hawk, McLeod, & Jeane, 1981; Schwartz & Kulhavy, 1982; Winn, 1982).

Surprisingly, despite the fact that a myriad of studies has been conducted during the past four decades assessing the effectiveness of advance organizers, few of these investigations have been undertaken at the graduate level. Thus, the authors sought to investigate whether achievement in graduate-level research methodology classes increases when students are introduced to advance organizers. Since most concepts which are introduced in research methodology courses form part of a system of ideas, and since these concepts tend to be related inherently to other ideas in the system which already are understood by the learner, it was hypothesized that graduate students enrolled in research methodology courses in which advance organizers are used would have higher levels of achievement than their counterparts who are not taught using advance organizers.

Method

Subjects and Procedure

Subjects comprised 218 students, who were enrolled in several sections of a graduate-level research methodology course over a two-year period. Fifty-four students were enrolled in the three sections in which advance organizers were used, whereas the remaining 164 students were enrolled in the eight sections in which advance organizers were not utilized. The same instructor taught all sections. The major course requirements, which were group-based, consisted of written critical evaluations of published research reports and preparation of research proposals. In-class examinations, comprising a midterm and a final, were administered individually.

With respect to the advance organizer groups, the majority of participants was female (80.2%), ranging in age from 23 to 56 (M = 32.3, SD = 7.8), and with a mean grade point average of 3.67 (SD = 0.41). With regard to the control group sample, most of the participants were female (79.3%), ranging in age from 22 to 55 (M = 31.7, SD = 8.4), and with a mean grade point average of 3.65 (SD = 0.40). No significance difference ($p < .05$) in mean grade point average was found between students in the advance organizer classes and those in the traditional classes.

According to the university graduate handbook, the course involved the "application of scientific method to educational research, including nature of research problems in education, theory of research, experimental design, techniques in data gathering, the interpretation of results, research reporting, and bibliographical techniques." For each 16-week semester, classes were held for three hours, once per week. The main requirement of the course was the completion of a research proposal. The objective of the proposal was to prepare

students throughly to be able to write proposals for dissertations and for seeking external funding. As such, the research proposals provided authentic assessment. Specifically, the research proposal, which could represent either quantitative or qualitative research on a topic of the student's choice, had to comprise a title, introduction section, review of the related literature, methodology section, analysis section, bibliography, and appendix section including a biography of the proposal writer, a timetable and budget, consent form(s), and author-designed instrument(s). Research proposals had to be unique, realistic, have educational significance, and extend the knowledge base. Students were expected to type their proposals, following guidelines specified by the American Psychological Association (1994). Students' writing style (e.g., grammar, punctuation, clarity, and application of American Psychological Association criteria (1994)) also was assessed. All proposals had to include an in-depth review of the literature, and thus extensive library usage was required. Indeed, although many research methodology instructors appear to require what could be conceptualized as a *mini-proposal*, the research proposal in this course was required to be extremely comprehensive. Historically, over the years, research proposals in this course typically have ranged from 25 to 40 pages, with the literature review section usually ranging from 5 to 15 pages. Students in both treatment conditions were encouraged to immerse themselves in their research proposals from the first class meeting. Moreover, students/groups were required to formulate their research questions by the second class meeting and to start obtaining literature sources by the third class meeting.

The second major course requirement involved a written critical evaluation of a published research report (article critique). The major goal of the article critique was to allow students to practice evaluating published research articles

utilizing principles of the scientific method. In order to prevent students from procrastinating, students were required to select several potential articles to critique and to bring them to the second class meeting for advice from the instructor as to their appropriateness. Furthermore, students were required to make their final selection as to which article to critique by the third week of the semester.

In both conditions, on the first day of class, students, in turn, were asked to introduce themselves to the whole class, disclosing their major, educational aspirations, profession, and interests. Following these introductions, students were asked to form groups comprising 3-4 individuals. Students were encouraged to choose group members based on major, profession, and proximity to each other's homes. The cooperative learning group that was utilized involved the use of base groups (Smith, Johnson, & Johnson, 1992). The aim of these base groups was to promote stable membership whose foremost responsibility was to provide each student the support, encouragement, and assistance needed to understand the material presented by the instructor and in the readings, with a view to (1) completing the group assignments successfully and (2) preparing students for the in-class examinations. Students were encouraged to stay together during the entire course. Although they were allowed to change groups if any conflicts or unresolvable problems arose among group members, no student requested such a change. Students were asked to exchange phone numbers and e-mail addresses and information about their schedules so that they could meet outside class. Each base group undertook one research proposal and one article critique.

The instructor informed students of the following basic group skills: every group member should participate as equally as possible, or at least according to

their strengths, students should respect the opinions of all group members, no students should dominate group discussions, and every student should be aware of all tasks undertaken by group members and to be prepared to provide constructive criticism. Students were not assigned specific group roles; however, they were presented with different models for the division of labor (e.g., each student writing a section of the research proposal and article critique; each student individually undertaking all sections of these assignments and then comparing their work with all other group members with a view to merging).

The only difference between the experimental and control groups was that advance and post organizers were utilized with the former. In the advance organizer conditions, a conceptually-oriented advance organizer was prepared for each chapter of the textbook. In addition, in each class period, the instructor allocated time for each cooperative base group to construct concept maps (i.e., post organizers) pertaining to each unit or chapter read previously. While students worked in groups, the instructor observed, answered questions posed by students, and informed the class of any insights gained from circulating among the groups. After a specified period of time, each base group would then display their concept maps to the other groups, who would subsequently critique them and compare and contrast these maps with their own graphical displays. From these between-group discussions, a consensus would then be reached as to which elements of the concept maps were the most appropriate. At this point, the instructor would check the whole-class concept map which emerged for accuracy and completeness. An example of a concept map which emerged is displayed in Figure 1.

Instruments

A scoring rubric was used to evaluate proposals and article critiques, with

detailed feedback provided. Students in both groups were given group scores for these assignments. Conceptual knowledge, which involved students' knowledge of research concepts, methodologies, and applications, was measured individually in both sets of classes via comprehensive written midterm and final examinations.

Results

An independent *t*-test revealed that students enrolled in the advance organizer sections of the course obtained higher ($t = 4.9$, $p < .0001$) levels of overall achievement ($M = 87.8\%$, $SD = 4.7\%$) than did their counterparts ($M = 83.3\%$, $SD = 8.4\%$). The effect size pertaining to this difference was .54, which is considered moderate (Cohen, 1988).

Discussion

Failure to understand research concepts may stem from inadequate utilization of existing prior knowledge (Spiro & Tirre, 1980). Since advance organizers are designed to activate relevant subsumers already present in the learner's cognitive structure (Ausubel, 1960, 1963, 1968), it was hypothesized that graduate students enrolled in research methodology courses in which advance organizers are used would have higher levels of achievement than their counterparts who are not taught using advance organizers. The results of the present study clearly support the effectiveness of advance organizers in promoting learning in research methodology courses, although caution should be exercised in interpreting the findings, due to the quasi-experimental nature of the study.

It is likely that advance organizers may have been effective in research methodology courses because they provided students with more direction for learning the concepts and facts which were presented by the instructor (Willerman & Mac Harg, 1991). That is, the advance organizers cued students as to what to

look for as they read the written materials. In particular, advance organizers may have helped students to examine cause and effect, to compare and to contrast concepts, and to investigate sequences of events and other relationships (Hawk, 1986). The advance organizers, especially the concept maps, may have been successfully used by many students as review instruments, strengthening their retention by giving stability to new information as a result of their subsuming qualities (Hawk, 1986). The concepts maps also may likely have provided reference points which assisted learners in assimilating new material and organizing the main concepts into a logical framework (Ausubel, 1963). This, in turn, may have activated many students' schemata relevant to the to-be-learned material. It is also possible that the advance organizers provided a *scaffold* or framework which was used to categorize, to encode, to store, and to recall new concepts (Ausubel, 1963).

Many graduate students, even those with high levels of overall academic achievement, tend to employ inappropriate study habits when attempting to learn research and statistical concepts (Onwuegbuzie, DaRos, & Ryan, 1997). In particular, these students often read to-be-learned material too quickly, which threatens their ability to understand fully many concepts (Onwuegbuzie et al. 1997). Thus, teaching students to utilize advance and post organizers may help to prevent them from reading material too quickly, as well as motivate them to modify material in light of material read in previous pages.

When students are required to learn new and unfamiliar research concepts without the benefit of organizers which subsume these concepts, the learning which occurs is most likely to be rote because students perceive that they have to memorize the material verbatim (Alexander, Frankiewicz, & Williams, 1979). Thus, in the present study, advance organizers may have increased performance

levels by helping to minimize rote learning and, at the same time, promoting meaningful learning and retention of research concepts.

Replications of this study are needed using an experimental design in order to assess the internal validity of the present findings. Nevertheless, the current results suggest that advance organizers can be an important instructional tool in research methodology courses, with the potential to increase achievement levels. Further research is needed to clarify the relationship between advance organizers and student performance in research methodology courses and to identify which types of advance organizers maximize meaningful learning in these classes.

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Figure Caption

Figure 1. Example of Student-Generated Concept Map